

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

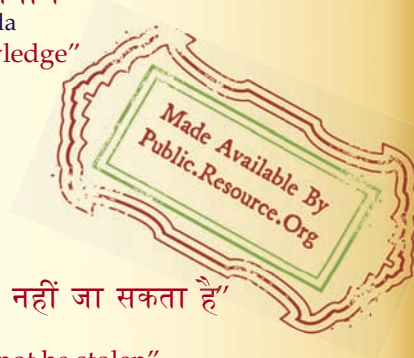
IS 4840 (2006): Metal powders - Determination of flow time by means of a calibrated funnel (hall flowmeter) [MTD 25: Powder Metallurgical Materials and Products]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



भारतीय मानक

धात्विक चूर्ण — अंशशोधित फनल द्वारा प्रवाह ज्ञात करना
(हॉल प्रवाहमीटर)
(दूसरा पुनरीक्षण)

Indian Standard

METALLIC POWDERS — DETERMINATION OF
FLOW TIME BY MEANS OF A CALIBRATED
FUNNEL (HALL FLOWMETER)
(*Second Revision*)

ICS 77.160

© BIS 2006

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

NATIONAL FOREWORD

This Indian Standard (Second Revision) which is identical with ISO 4490 : 2001 'Metallic powders — Determination of flow time by means of a calibrated funnel (Hall flowmeter)' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of Powder Metallurgical Materials and Products Sectional Committee and approval of the Metallurgical Engineering Division Council.

This standard was first published in 1968 and revised in 1984 harmonizing with International Standard ISO 4490 : 1978. Since ISO 4490 was revised in 2001, therefore, need was felt to revise IS 4840 also.

The text of the ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

The sampling of the powder for conducting the test is given in National Annex A.

In reporting the result of a test or analysis made in accordance with this standard, if the final values, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (revised)'.

Indian Standard

**METALLIC POWDERS — DETERMINATION OF
FLOW TIME BY MEANS OF A CALIBRATED
FUNNEL (HALL FLOWMETER)**

(Second Revision)

1 Scope

This International Standard specifies a method for determining the flow time of metallic powders, including powders for hardmetals, by means of a calibrated funnel (Hall flowmeter).

The method is applicable only to powders which flow freely through the specified test orifice.

2 Principle

Measurement of the time required for 50 g of a metallic powder to flow through the orifice of a calibrated funnel of standardized dimensions.

3 Apparatus

3.1 Calibrated funnel, having the dimensions shown in Figure 1 (see clause 4).

The funnel shall be made of a non-magnetic, corrosion-resistant metallic material having sufficient wall thickness and hardness to withstand distortion and excessive wear.¹⁾

3.2 Stand and horizontal vibration-free base, to support the funnel rigidly, e.g. as indicated in Figure 2.¹⁾

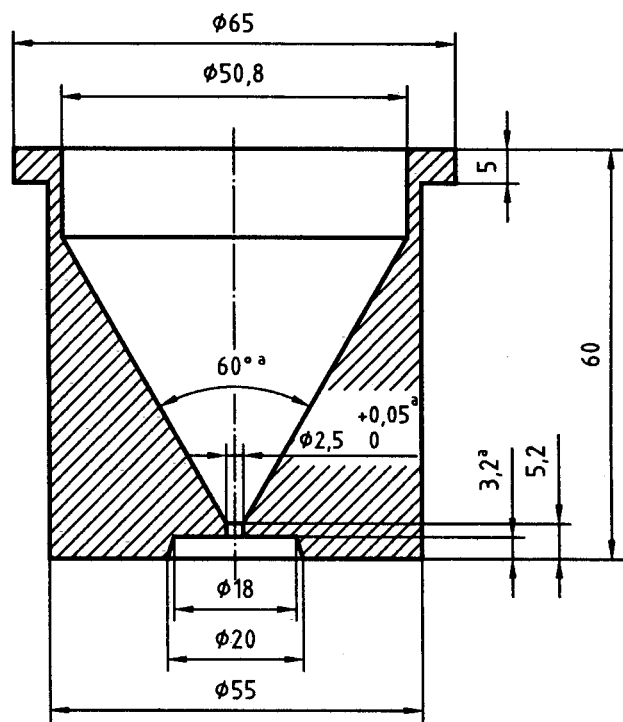
3.3 Balance, of sufficient capacity, capable of weighing the test portion to an accuracy of $\pm 0,05$ g.

3.4 Stopwatch, capable of measuring elapsed time to an accuracy of $\pm 0,1$ s.

3.5 Chinese emery grit, a reference powder used for calibration of the funnel.¹⁾

1) Apparatus complying with 3.1 and 3.2, and standard Chinese emery grit can be purchased from AcuPowder International, LLC, 901 Lehigh Avenue, Union, NJ 07083, USA. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the company named above. Equivalent products may be used if they can be shown to lead to the same results.

Dimensions in millimetres



^a These dimensions are mandatory.

Figure 1 — Calibrated funnel (Hall flowmeter)

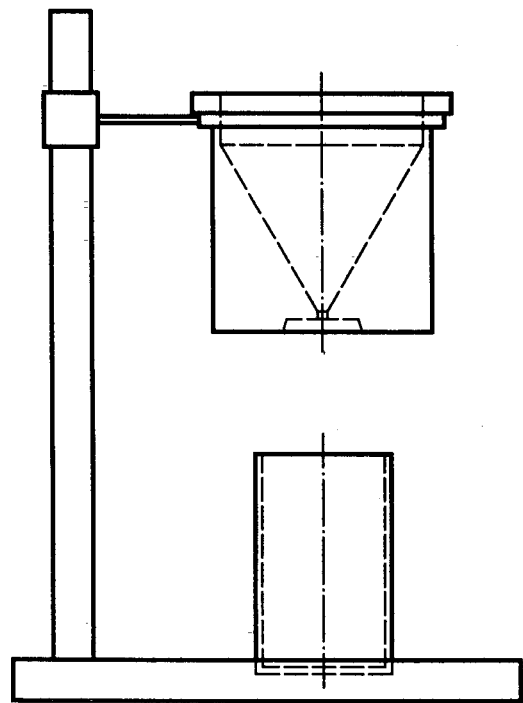


Figure 2 — Arrangement of calibrated funnel and stand

- b) Cool the emery to room temperature in a desiccator.
- c) Weigh out 50 g of the emery grit.
- d) Follow the procedure outlined in clause 6.
- e) Repeat the procedure with the same 50 g mass of emery until there are five determinations within 0,4 s.
- f) The average of these five determinations is stamped on the bottom of the funnel and shall be within $40,0 \pm 0,5$ s.

NOTE The Chinese emery grit used as reference powder replaces the Turkish emery grit from the earlier edition of this International Standard, as the latter is no longer available. The Chinese emery has been found to be more sensitive and the instructions should therefore be followed carefully.

4.2 Calibration by the user of the funnel

The flow time of the reference sample shall be determined by the above method. If the flow time has changed to be outside $40,0 \pm 0,5$ s, a correction factor must be used when measuring different powders. This correction factor is obtained by dividing 40,0 by this new value for the Chinese emery grit.

NOTE 1 It is recommended that the users periodically verify whether a correction is needed or not.

NOTE 2 It is recommended that before a correction factor is adopted the cause of the change be investigated. If the flow time has decreased it is probable that repeated use has burnished the orifice and a (new) correction factor is justified. An increase in flow time may indicate a coating of soft powder on the orifice. This coating should be carefully removed and the calibration test repeated.

NOTE 3 It is recommended that the use of a funnel be discontinued after the flow time of the reference sample has decreased to less than 37 s.

5 Sampling

5.1 The mass of the test sample shall be at least 200 g.

5.2 In general, the powder shall be tested in the as-received condition. In certain cases, and after agreement between supplier and user, the powder may be dried. However, if the powder is susceptible to oxidation, the drying shall take place in vacuum or in inert gas. If the powder contains volatile substances, it shall not be dried.

5.3 Immediately before the test, weigh out a $(50 \pm 0,1)$ g test portion.

5.4 The determination shall be carried out on three test portions.

6 Procedure

Transfer the test portion to the funnel, keeping the discharge orifice closed by a dry finger. Take care that the stem of the funnel is filled with powder. Start the stopwatch (3.4) when the orifice is opened and stop it at the instant the last of the powder leaves the orifice. Record the elapsed time measured to the nearest 0,1 s.

Alternatively, the orifice can be kept open, when the test portion is transferred to the funnel with the rest of the procedure being the same.

NOTE If the powder does not begin to flow when the orifice is opened, one slight tap on the funnel to start flow is permitted. If this has no effect, or if the flow stops during the test, the powder is considered to possess no flowability according to the test method described in this International Standard.

7 Expression of results

Calculate the arithmetic mean of the results of the three determinations and report the value in seconds per 50 g, rounded to the nearest second. If a correction factor (see 4.2) should be used the average shall be multiplied by this correction factor.

8 Precision

8.1 Repeatability

From spherical powders with shorter flow times than 20 s for 50 g, duplicated tests using the same equipment by the same operator on one homogenized batch of powder should be considered suspect, if they differ by more than 0,1 s at a 95 % confidence level.

8.2 Reproducibility

Adequate values are not available for this edition of ISO 4490.

9 Test report

The test report shall include the following information:

- a) reference to this International Standard, i.e. ISO 4490;
- b) all details for identification of the test sample;
- c) the result obtained;
- d) the use of open orifice;
- e) all operations not specified by this International Standard, or regarded as optional (e.g. the drying procedure applied and whether flow has been induced by tapping the funnel);
- f) details of any occurrence which may have affected the result.

NATIONAL ANNEX A

(National Foreword)

A-1 The sampling of the powder for conducting the test shall be in accordance with IS 6492 : 1972 'Methods for sampling of powders for powder metallurgical purposes'.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

This Indian Standard has been developed from Doc : MTD 25 (4412).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002
Telephones : 2323 0131, 2323 3375, 2323 9402 Website : www.bis.org.in

Regional Offices :		Telephones
Central	Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110 002	{ 2323 7617 2323 3841
Eastern	1/14 C. I. T. Scheme VII M, V. I. P. Road, Kankurgachi KOLKATA 700 054	{ 2337 8499, 2337 8561 2337 8626, 2337 9120
Northern	SCO 335-336, Sector 34-A, CHANDIGARH 160 022	{ 260 3843 260 9285
Southern	C. I. T. Campus, IV Cross Road, CHENNAI 600 113	{ 2254 1216, 2254 1442 2254 2519, 2254 2315
Western	Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400 093	{ 2832 9295, 2832 7858 2832 7891, 2832 7892

Branches: AHMEDABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE.
FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR.
LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAJKOT.
THIRUVANANTHAPURAM. VISAKHAPATNAM.